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United States Patent Application

For

**SYSTEM OF FORMING A SHEET OF EASILY AND  
CLEANLY SEPARABLE PRINTABLE MEDIA**

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Drawings: 3 sheets

**SYSTEM OF FORMING A SHEET OF EASILY AND CLEANLY SEPARABLE  
PRINTABLE MEDIA**

**Cross-Reference to Related Application**

This is a continuation-in-part of copending  
5 application Serial No. 08/641,332, filed April 30, 1996,  
the entire contents of which are hereby incorporated by  
reference.

**Background of the Invention**

10 The present invention relates to methods of forming  
business cards and to the constructions of sheets of blank  
business cards for passing through laser or ink jet  
printers or copiers.

A sheet of business cards as known in the prior art  
15 is shown in FIG. 1 generally at 100. Sheet 100 is a  
drawing of the sheet after having passed through a laser  
or ink jet printer and with the desired indicia 104  
printed thereon. Sheet 100 was formed with a gridwork of  
horizontal and vertical microperforation lines 108, 110  
20 extending the full length and width of the sheet. The  
microperforations are typically more than fifty per inch.

Although the microperforations are thereby small and  
close together, when the cards 112, after the printing  
operation thereon, are separated from one another by  
25 tearing along the lines, perfectly clean cuts or edges do  
not result. Rather, the edges 114 are slightly fuzzy as  
shown in the enlarged view of FIG. 2. These fuzzy edges  
114 give the card 112 a less professional look than clean

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knife cut edges and in certain uses are unacceptable. Currently, business cards have substantially clean edges as they are manufactured by Quick printers (such as KINKOS or PIP). However, the laser and ink jet card products including laser and ink jet card products do not provide clean edges, similar to the main stream business cards.

### Summary of the Invention

Directed to remedying problems in the prior art, disclosed herein is an improved business card sheet assembly. The assembly includes, according to one preferred embodiment, a card stock sheet having two parallel pairs of substantial-cut lines extending the length of the sheet and engaging the sheet at both ends thereof. Instead of paper sheets, rolls, fan fold or other print media can be used. The substantial-cut lines extend about 90% through the thickness of the sheet from the front towards the back surface. The sheet is then die cut with short (through-cut) lines extending widthwise between the lines of each pair, or vice versa. The substantial-cut and through-cut lines form on the sheet two columns of business card blanks, with paper waste strips at the side (and end) margins and between the columns. The sheet is then passed through desk top printers, such as laser or ink jet printers or copiers, and the desired indicia is printed on each of the blanks. The printed card blanks are then separated from one another along the substantial-cut and through-cut lines.

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The borders or edges of the resulting cards are cleaner, superior to the prior art microperforated cards.

To provide for an even cleaner card edge where it was separated along the substantial-cut lines, the substantial-cut lines can be formed by scoring the sheet part way on both faces of the sheet. Thereby, the intact portion of the sheet along these lines will be at the middle (approximately ten or twenty percent) thickness of the sheet. After separation, the torn fibers, being in the middle of the sheet, will be less visible. Also, this construction allows for greater manufacturing control of the formation of the substantial-cut lines to accommodate for different thickness of the paper, depending on where it is taken from the paper roll.

Additionally, a cleaner card edge can be provided by first making the paper more brittle, by densifying its fibers. Preferably, this is done by supercalendering the paper. Supercalendering is a process that has been used by paper manufacturers for many years to produce relatively denser and thinner paper. Instead of supercalendering, the paper can be done by subjecting the paper to chemical or radiation treatments, or other ways as would be apparent to those skilled in the art from this disclosure.

Other objects and advantages of the present invention will become more apparent to those persons having ordinary skill in the art to which the present invention pertains from the foregoing description taken in conjunction with the accompanying drawings.

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**Brief Description of the Drawings**

FIG. 1 is a front view of a sheet of business cards of the prior art, after having been printed, and showing one of them being torn away along its microperforation lines;

FIG. 2 is an enlarged view taken on circle 2 of FIG. 1;

FIG. 3 is a perspective view showing sheet assemblies of the present invention passing through a printer;

FIG. 4 is a front elevational view of one of the sheet assemblies of the present invention after a printing operation has been performed thereon;

FIG. 5 is an enlarged view taken on line 5-5 of FIG. 4;

FIG. 6 is an enlarged view taken on line 6-6 of FIG. 4;

FIG. 7 is a view similar to FIG. 6 showing an alternative embodiment of the present invention; and

FIG. 8 is a front elevational view of an alternative sheet assembly before a printing operation.

**Detailed Description of Preferred Embodiments of the Invention**

Referring to FIGS. 3-6, a sheet assembly of the present invention is shown generally at 130. The sheet assembly 130 is shown at the bottom left of FIG. 3 before entering the printer 134 and as it would be purchased by the user (after removal from its packaging (not shown)).

The sheet assembly 130' is shown in the upper right of FIG. 3 and (in isolation) in FIG. 4 after having passed through the printer 134, and with the identifying indicia shown generally at 140 printed thereon. As an example, 5 the indicia 140 can include the individual's name 142, address 144, title 146, company name 148 and company logo 150. It can additionally or alternatively include other information such as telephone and facsimile numbers and/or E-mail addresses as desired. The printer 134 can be a 10 laser or ink jet printer, or photocopier.

The sheet assembly includes a sheet of paper 160 such as ten mil thick cardstock available from Simpson Paper Mill in Pomona, California. The thickness of the sheet of paper 160 is preferably between seven and twenty mils. A 15 pattern of sheet portions or cards 164 is defined on the sheet by a pattern of lines. The sheet portions 164 are preferably rectangular, but other shapes are within the scope of the invention. For example, the sheet 160 can have dimensions of 8 1/2 x 11 inches and each of the 20 portions 164 can have the dimensions of a traditional business card (e.g., two by three and a half inches).

Alternatively, the sheet 160 can be supercalendered paper material. It can have a thickness of between one mil to ten mil plus, and preferably between six and 25 thirteen mil. The reason for this somewhat broad thickness range is that some printers, such as ink jet printers, cannot handle heavier or thicker material so that card stock of six, seven or eight mils is needed. On the other hand, other copiers and printers, such as laser

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printers, can handle thicker materials. The supercalendering process compresses the paper so that its thickness is reduced by between two and forty percent, for example.

5 The weight of the paper sheet can be between sixty and one hundred and fifty pounds. While the lower end of that range may be a little too low, the upper end is probably more realistic. One hundred and fifty pound non-calendered paper is typically thirteen to fifteen mil  
10 thick and thereby generally too thick to pass through today's printers. However, that same weight paper when supercalendered has a reduced thickness of eleven to thirteen mil, which is thin enough to pass through most printers.

15 Supercalendering is a process that crushes or compresses the fibers of the sheet, thereby densifying the sheet. Because the sheet is densified, its fibers break or crumble easier along the desired lines. This provides for cleaner edge lines for the business cards.

20 Although supercalendering is a preferred method of making the paper fibers brittle, other processes are within the scope of this invention. One example is to apply radiation, such as ultraviolet or gamma energy, to the sheet. This can be over the entire sheet evenly or  
25 more focused along the desired separation lines. Another process is to apply a chemical to the sheet, such as a dilute acid coating. Again, this can be an even coating on the paper or a more focused application along the desired separation lines. It can be applied before, after

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or during the formation of the separation lines. For example, if the separation lines are formed by scoring, the chemical may be deposited by application physically on the scoring knives or tools. Separation lines or the entire sheet can be created with stiffening and weakening materials, such as polymers. For example, the sheet can be coated with a very hard polymer, making the entire sheet more brittle, or just the separation lines coated with this brittle polymer.

At least one of the defining lines is a "substantial-cut" line 170, cut along its entire length, substantially but not all of the way through the paper 160; that is, cut from the top surface 174 of the paper approximately ninety percent the way through towards the bottom surface 178. This is shown in enlarged view in FIG. 6. A preferred embodiment has the substantial-cut line(s) 170 extending 9.3 to 9.5 mil through a ten mil thick cardstock. Alternatively, they can extend between seventy and ninety-eight percent of the distance therethrough. The substantial-cut lines 170 can be formed by trimming wheels (rotary knives), by die cutting, laser scoring, or chemical or acid etching.

A preferred pattern of defining lines is best shown in FIG. 4. It includes four parallel lengthwise lines 180, 182, 184, 186 extending the length of the sheet 160 and defining two parallel columns 190, 192 with waste strips 196, 198 at the outer edges and one center waste strip 202 between the columns. Spaced parallel widthwise lines 208, 212 extend the widths of the columns 190, 192,

but not beyond them. As can be understood from FIG. 4, the lengthwise lines 180, 182, 184, 186 define the left and right edges of the sheet portions or cards 164 and the widthwise lines 208, 212 extend from the top and bottom edges thereof.

The lengthwise lines 180, 182, 184, 186 are each substantial-cut lines 170 as disclosed above. And the widthwise lines 208, 212 are preferably each through-cut lines, as best shown in FIG. 5 at 220, extending the entire distance through the sheet 160 along their entire lengths; that is, they are between and engage adjacent of the lengthwise lines. The through-cut lines 220 define a perfectly smooth edge and thus are preferred over microperforated or substantial-cut widthwise lines. They also do not require any separating effort. Preferably, none of the through-cut lines 220 engages any edge of the sheet 160. If they did, the sheet 160 would be likely to be torn prematurely along the line. However, the pattern of substantial-cut and full-cut lines still provides the card stock sheet 160 with sufficient integrity to reliably pass through the printer without breaking apart.

After the sheet assembly 130 has passed through the printer 134 and the desired indicia 140 printed thereon, the individual cards (or printed media) 164 are separated by tearing or pulling along the four substantial-cut lines. Of course, no further separation is required on the through-cut lines. The side and center waste strips 196, 198, 202 can then be disposed of, as can the end margin strips 240, 244 at the ends of both of the columns.

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As described above, relative to FIG. 6, the substantial-cut lines can be formed through one side (or face) of the paper 160. An alternative embodiment forms the substantial-cut line by "cutting" (or penetrating) the sheet from both sides, as shown in FIG. 7, by top cut or penetration 250 and bottom cut or penetration 254, leaving a thin center piece 258. These two penetration lines 250, 254 can be formed by trimming wheels (rotary knives), by die cutting, laser scoring, or chemical or acid etching. Preferably, they are formed with a scoring process.

If the paper 160 is a ten mil sheet, the top and bottom scorings 250, 254 can each be two mil, leaving about sixty percent of the fibers intact in the center 258. Alternatively, the scorings can even be 4.75 mil from both sides, leaving the center 258 only one-half mil thick (or any distance in between). The sheet 160 with this thin center 258 will have enough integrity not to fall apart depending on the kind of paper used and the configuration of the printer path. If the path is very convoluted, the one-half mil may not be enough, but for (printers with) straight paths it will likely be sufficient. Half mil thickness may also be sufficient where the paper 160 has long fibers, or where the paper has not been supercalendered or otherwise made brittle as discussed above.

Scoring on both sides tends to give the card (or printed media) when separated from the rest of the sheet a cleaner edge. One reason for this is that the separated fibers are in the middle of the sheet, not hanging out

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from either the top or bottom. When they are in the middle of the sheet 160 (that is, the middle of the thickness of the paper), they are likely to be less visible to the human eye.

5 Also, scoring on both sides provides another level of control in the manufacturing process of this assembly. Paper 160 will vary in thickness depending upon whether it is sliced from one end of the paper roll, the middle or the other end. When scoring on two sides, as depicted in  
10 FIG. 7, there is a better opportunity to adjust to variations in paper thickness, because two controls are thereby available.

A preferred technique is to score the top and bottom cuts 250, 254 simultaneously. However, it is also within  
15 the scope of the present invention to make the top and bottom scores at different times. This scoring can be by mechanical means, such as knives, by chemical means or by laser means. Additionally, these score lines can be oriented either horizontally or vertically relative to the  
20 direction in which the scoring machine is running.

Another sheet embodiment is shown in FIG. 8 at 270 having four lengthwise scored (not through-cut) lines 274, 278, 282, 286. Then the widthwise lines will have two through-cut lines 290, 294, not extending across the side  
25 margins 298, 302 or the center gutter 306.

An alternative arrangement provides short perforated lines 310, 314, 318 across both side margins 298, 302 and the center gutter 306. Although these short perforated lines provide for easier user access to the (ten) business

cards 322 in the two columns, they also make the manufacture of the sheet 270 more difficult and thus may be eliminated if desired. Thus, the perfectly clean through-cut edges are provided on the top and bottom of each of the cards, and the left and right ends are defined by the scored lines. Alternatively the positioning of the score lines and through-cut lines can be reversed, if desired.

From the foregoing detailed description, it will be evident that there are a number of changes, adaptations and modifications of the present invention which come within the province of those skilled in the art. However, it is intended that all such variations not departing from the spirit of the invention be considered as within the scope thereof as limited solely by the claims appended hereto.

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